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ABSTRACT

This Technical Research Report is primarily designed for reference by educational testing and measurement specialists as a supplemental guide to interpretation of Armed Services Vocational Aptitude Battery (ASVAB) results in local and state career guidance and counseling programs. This study examined the validity of specific ASVAB composites from a sample of 6,130 students in 25 high schools offering vocational-technical curricula. School samples were obtained through voluntary participation. A general conclusion indicates that, for the most part, form 2 of the ASVAB does do well in predicting success in a number of vocational-technical categories. For those categories where form 2 of the ASVAB does not appear to predict well, further exploration is needed to delineate the ability factors necessary for academic success in those categories. (Author/DEP)

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AFVTG TECHNICAL RESEARCH REPORT NUMBER 74-5

**A CONCURRENT VALIDITY STUDY RELATING THE
ARMED SERVICES VOCATIONAL APTITUDE BATTERY
TO SUCCESS IN HIGH SCHOOL
VOCATIONAL-TECHNICAL COURSES**

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This research report is a more comprehensive treatment of data previously distributed through Armed Forces Vocational Testing Group (AFVTG) Technical Research Note 74-4 (January 1975). Work performed in support of this research was conducted as a subpart of AFVTG research project unit 117; under guidelines prescribed in Department of Defense Instruction 1304.12 (December 1972).

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PREFACE

This Technical Research Report is primarily designed for reference by educational testing and measurement specialists as a supplemental guide to interpretation of Armed Services Vocational Aptitude Battery (ASVAB) results in local and state career guidance and counseling programs.

This study examined the validity of specific ASVAB composites from a sample of 6,130 students in 25 high schools offering vocational-technical curricula. School samples were obtained through voluntary participation. The investigators are indebted to all participating counselors, administrative personnel and principals.

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A CONCURRENT VALIDITY STUDY RELATING THE ARMED SERVICES VOCATIONAL APTITUDE BATTERY TO SUCCESS IN HIGH SCHOOL VOCATIONAL-TECHNICAL COURSES

I. INTRODUCTION

This project is in line with the testing philosophy of continuing to update a test in order to bring to the users additional information which should enable them to better utilize the test to meet their stated objectives.

With the rise of interest in career education and increased amounts of vocational information being made available to a variety of people, i.e., continuing educational specialist, vocational rehabilitation specialists, etc., the identification of work areas for making vocational decisions is becoming an integral part of the educational process of young people. Many young people are looking for the vocational niche into which they may safely and securely blend into the "normal" development of the life cycle. Individuals seek vocational placement which will enhance their effectiveness via a variety of methods. The use of the Armed Services Vocational Aptitude Battery (ASVAB) is committed to that goal whether it be for military services or civilian processes.

Since 1958, the armed services have been involved in a nationwide high school testing program. Initially, the services operated separate testing programs, with each service using its own battery. In 1966, through a joint effort by test experts from each service, the Armed Services Vocational Aptitude Battery (ASVAB) was conceptualized to fulfill the need for a test battery which would be appropriate for use by all services. By 1970, the ASVAB-1 (Bayroff and Fuchs, 1970) was developed and prepared for use in the academia. (See Appendix 1 for a description of ASVAB subtests and the five composites used for reporting results to the high school counselor.)

In utilizing the ASVAB, the military services have been able to offer the high school testing program to interested schools as a means of sharing extensive service experience in testing potential ability and occupational classification and concurrently stimulating student interest in service jobs and training opportunities.

There is a general agreement among educational authorities that job performance in some civilian occupations approximates very closely that in the military. Although the manner in which the jobs are performed may differ, the properties are essentially the same. While there are sound reasons for believing that these assumptions about job comparability are true (i.e., teletype operator, computer repair and operations, telephone installers, air traffic control tower operator, plumber, electrician, heavy equipment operator, court reporter, etc.), the data base supporting these assumptions has not been extensive. Many of these conclusions arise from intuitive rather than empirical support. What is lacking is research using salient and reliable variables that allow for an identification of relationships between ASVAB and the criterion variables the test is supposed to complement, namely, success on a job or in training for a vocation. The main purpose of this study is to report one such research effort. This paper presents a study in which samples of the vocational-technical population were assessed on ASVAB-2, as well as on secondary vocational-technical school criterion. The general purpose of this study was to evaluate the relationships between the variable grade point average (GPA) and the various subtests of the predictor variable (ASVAB). The specific purpose of the study was to ascertain the qualitative interaction of the predictor (ASVAB) and criterion variables (GPA).

HYPOTHESES

In order to investigate whether or not present composites or derived composites will be able to predict success in civilian vocational-technical high schools, the following four sets of hypotheses were tested for significance at the .05 level:

Hypothesis 1. The full complement of ASVAB-2 subtests can predict success in civilian vocational-technical high schools.

$$R_{1,2,3} \dots \neq 0$$

The First Null Hypothesis: The full complement of ASVAB-2 subtests will not give better than chance predictions for high school vocational-technical grades.

$$R_{1,2,3} \dots = 0$$

Hypothesis 2. The full complement of ASVAB-2 subtests is significantly better than the current composites for predicting success in civilian vocational-technical high schools.

$$R_{1,2,3} \dots - r_{cc} \neq 0 \text{ where } r_{cc} = r \text{ current composite.}$$

Second Null Hypothesis: There is no difference between the current ASVAB-2 composites and the ASVAB-2 battery for predicting success in civilian vocational-technical high school courses.

$$R_{1,2,3} \dots - r_{cc} = 0$$

Hypothesis 3. The full complement of ASVAB-2 subtests can predict significantly better than any valid set of composites that can be formed from two or three ASVAB-2 subtests.

$$R_{1,2,3} \dots - r_{nc} \neq 0, \text{ where } r_{nc} = r \text{ new composite.}$$

Third Null Hypothesis: There is no difference between composites of two or three subtests and the ASVAB-2 battery.

$$R_{1,2,3} \dots - r_{nc} = 0$$

Hypothesis 4. A composite can be formed with two or three ASVAB-2 subtests that predicts significantly better than the current composite.

$$r_{cc} - r_{nc} \neq 0$$

Fourth Null Hypothesis: There is no difference between the selected composite and the current composite.

$$r_{cc} - r_{nc} = 0$$

The reason for the use of R was that it could give useful estimates of magnitudes of effects and their significance. R^2 indicates the amount of variance in the dependent variable (GPA) that was associated with or accounted for by the independent variables (nine subtests) (Guilford, 1965).

THE LITERATURE

Previous studies showing a relationship between ASVAB and vocational-technical school performance are sparse. The studies that were performed utilized military technical training schools. One such study was performed by Patricia J. Thomas (1970), who compared the Armed Services Vocational Aptitude Battery (ASVAB) with the Navy Basic Test Battery (BTB) by computing correlation between ASVAB and BTB scores with training school performance.

The sample consisted of 47,000 recruits at the Naval Training Center in San Diego and Great Lakes during 1968. After matching this sample with Class "A" school data tapes to identify school-trained men and to obtain school performance as a criterion measure, the sample was reduced to 19,-

681 men. The variables utilized were eight of the nine ASVAB tests, all five subtests of the BTB, and final school grades obtained from 47 technical schools. The validity information for ASVAB from this study is contained in Appendix 2.

Ms. Thomas' conclusions were that "the basic test battery was shown to be better than the ASVAB-1 as a classification battery for Navy recruits. Although the validities reported for the ASVAB were higher than the BTB in a few schools, the analyses of samples taken from all schools consistently favored the BTB. This situation could change when Form 1 of the ASVAB is superseded provided the two new forms are a substantial improvement over Form 1." (Thomas, 1970, p9).

In a study performed by Vitola, Mullins and Croll (1973), ASVAB composites (General, Administrative, Mechanical and Electronics) were used to predict the probability of success in US Air Force (USAF) technical training schools. The sample consisted of 8,151 non-prior service basic airmen who were in the Air Force during the period October 1968 through July 1969. The criteria for sample selection were based upon a minimum aptitude index of 40 on at least one composite of the Airman Qualifying Examination (AQE). The AQE was an aptitude test given by the USAF to high school seniors. The individuals must have taken the ASVAB-1 during the above time periods and successfully completed a course at a technical school to which they had been assigned after completing basic training. Due to restriction of range, a correction was used to estimate the correlation in an unrestricted sample. Forty-six courses met the above criteria.

The results of the study indicated that ASVAB-1 could predict technical school success at approximately the same level of validity as the AQE. "It appears that ASVAB has demonstrated its worth as an instrument for use in the military high school testing program, and as a selection instrument in the initial classification and assignment process of the Air Force personnel system" (Vitola, Mullins and Croll, 1973, p15). See Appendix 3 for Air Force validity data.

In contrast to the above studies, no research has been done to date in which ASVAB has demonstrated its usefulness in civilian areas, much less in identifying individuals who are qualified to enter a particular civilian occupational area with a reasonable chance of success. Perhaps more critical is the fact that in the two research reports cited, there are certain methodological problems which restrict the propensities for generalizing the results. Too often the findings of one researcher who has selected a particular sample to study are contrasted with the findings of another researcher who has utilized a different sample. Such a comparison is a legitimate cross-validation procedure but it may suffer from a lack of actual comparability between studies (Ghiselli, 1966).

II. METHOD

SUBJECTS: This report includes only the students who took the Form 2 of ASVAB during school year 1973-74. The study is concerned with vocational-technical grade point averages (GPAs) and the overall GPAs. The results for the Form 1 of ASVAB will be reported in a separate publication.

The sample consisted of 6,130 students who were attending high schools offering curricula in vocational-technical courses. Figure 1 shows the geographical representation of the sample.

The sample is identified in Table 1 which gives the distribution of the sample with respect to the size of the population center where the school is located. The data received from the schools resulted in the composition of the sample being primarily all male for male-oriented occupations, i.e., mechanics, and all female for female-oriented occupations, i.e., nursing. The last column shows the percent of the total sample (6,130) coming from the population center characterized in Column 1.

PROCEDURE: The method employed in data collection across all schools followed the same pattern. The ASVAB historical file at the Air Force Human Resources Laboratory (AFHRL) was examined for the names of high schools where the number of students tested exceeded 50 during school years 1972-73 and 1973-74. The number 50 was used to account for attrition of students within the high schools and the various vocational-technical areas. Attrition was the reason two schools in the sample had a total N less than 50. It was believed that schools with less than 50 students tested would produce numbers in each of the vocational-technical areas that would be insufficient for the study. This

Population Center (PC) Size	Sample N's	Percent of Total N Within Each PC
Less than 10,000	889	14.5
10,000 to 50,000	1519	24.8
50,000 to 100,000	470	7.7
100,000 to 500,000	3106	50.7
Greater than 500,000	146	2.4
TOTAL	6130	

12

would result in a limited contribution to the study. From the identified high schools, 61 schools were identified as having vocational-technical courses. The AFHRL sent a letter (see Appendix 4) to all 61 schools explaining the purpose of the proposed study and requested their participation.

Personnel of the AFVTG contacted each school by telephone as a followup to the initial letter (see Appendix 5). The school officials who gave a verbal assent to participate in the study were advised they would be contacted by a test administrator. The time period for the study was established to account for fluctuations in school and test administrators' time. For some schools, higher authority than the principal (superintendent) was needed to gain entry to the school. These people were contacted and their decisions determined whether the school contact was continued or dropped. Of the 61 schools identified, 30 schools were unable to participate in the study for a variety of reasons, i.e., too late in the year, not using ASVAB this year, etc. Of the remaining 31 schools, 25 schools had test data for ASVAB-2. After the schools were contacted, the test administrators in the field were contacted (see Appendix 6) and asked to collect the necessary data. The student identification information furnished to the test administrator was computer retrieved from the ASVAB historical files at AFHRL. The test administrator was asked to obtain the identity of the vocational-technical course being taught (vocational-technical category), the student grade average in these courses (vocational-technical GPA) and where feasible his overall high school grade point average (GPA). The overall GPA is the combination of academic and vocational course grades. The last was not feasible where the vocational-technical school was a separate entity serving several high schools. The only grades available at this latter type vocational-technical school were the vocational-technical grades.

The information obtained was in a variety of forms, i.e., letter grades, quality points or a combination of both. Such variance in school grades exists when utilizing information across school systems. This creates difficulties in the manipulation of such information. These difficulties arise when one or more schools differ in quality of students, quality of instructions, competitiveness, grading standards, etc. (Marks and Murray, 1965). These factors contribute to the lack of homogeneity of error variance which prohibits uniform information about school achievement for all students. Such variability in the meaning of achievement does not warrant the use of elaborate formulae for manipulating scores. On the contrary, a simple weighting structure by which inter- and intra-school scores could be manipulated may be apropos. The National Association of Secondary School Principals and the American Association of Collegiate Registrars and Admissions Officers have offered a method whereby comparison of school grades could be done with a minimum of confusion. Table 2 illustrates their "Proposed Weighting Model" (Seyfret, 1972, p77).

Although each of the above levels is acceptable for conversion purposes, level 3 was selected to facilitate computational processes. The common meter for conversion was the letter grade. Table 3 shows the breakdown of the types of grades received. Table 4 shows the conversions that were made

Table 2. Numerical Value of Marks by Levels

Mark	Level 1	Level 2	Level 3
A	6	5	4
B	5	4	3
C	4	3	2
D	3	2	1
F	0	0	0

Table 3. Reported Grades*

School Codes	Percent	Letter	4-Pt Scale	10-Pt Scale
07	X			
09	X	X		
10				X
12			X	
14				
15			X	
17			X	
22			X	
24				
28		X		
30		X		
34		X		
36		X		
38		X		
42		X		
45			X	
48			X	
51			X	
52		X		
53			X	
54		X		
55				
57			X	
58		X		
59		X	X	

*Two schools reported utilizing two systems for grading, one for vocational-technical GPA and one for overall GPA.

from one system to another. Figure 2 shows the conversion chart and formula to convert the ten-point system to a four-point system.

Each method of conversion was selected to retain the student ordering information inherent in the various systems used to report grades by the schools in the study.

Table 4. Conversions for GPA to Letter Grades

4 Point Scale	Percents I	Percents II	10 Point Scale
A = 4	A = 91-100	A = 93-100	A+ = 10
B = 3	B = 81-90	B = 85-92	A = 9
C = 2	C = 71-80	C = 78-84	A- = 8
D = 1	D = 61-70	D = 70-77	B+ = 7
F = 0	F = 0-60	F = 0-69	B = 6
			B- = 5
			C+ = 4
			C = 3
			C- = 2
			D = 1
			F = 0

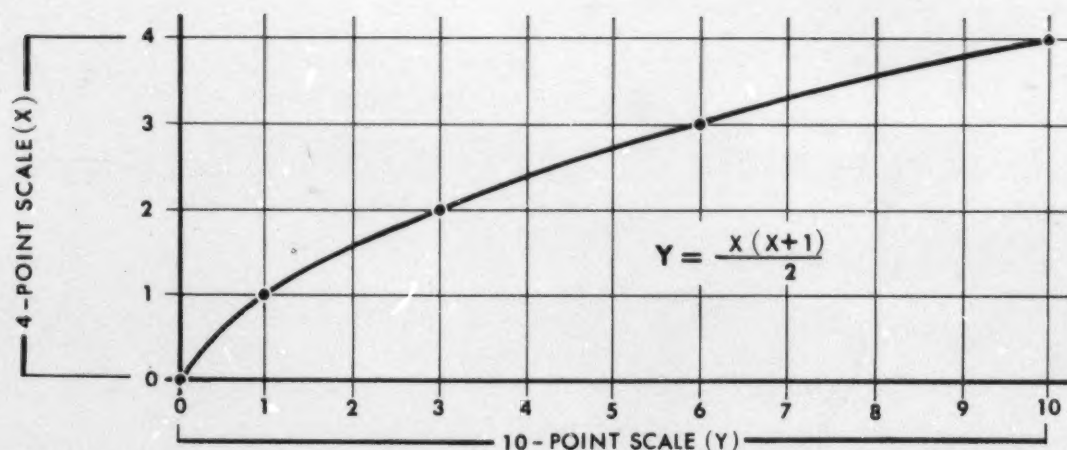


Figure 2. Ten Point to Four Point Grade Conversion Chart

Table 5 shows the sample distribution by school code by USOE cluster by category. Total sample for each school is indicated at the end of the school column.

Vocational-technical courses were identified and combined by catalog description furnished by various schools. Where these descriptions were not available, courses were placed into a category of apparent similar nature. The categories were then grouped by the clusters used by the US Office of Education. See Appendix 7.

Upon completion of the criterion data collection, this information was collated by computers at AFHRL with students' scores on the ASVAB.

The schools were identified by a number to maintain the anonymity of both the schools and their students. The measure of success or the criterion variable was the GPA for a vocational-technical course. The predictor variables were the raw scores on each of the ASVAB subtests.

STATISTICAL ANALYSIS: The analysis consisted of a number of regressions using the AFHRL computer facility. The multiple linear regressions that were done are as follows:

- A separate regression was performed for each school and each vocational-technical category where the sample size exceeded 20.
- A regression was performed for each vocational-technical category where the sample was the total across those having 20 or more students in that category.
- A regression was performed for each vocational-technical category where the sample was the total across those schools having students in that category.
- A regression was performed for the total sample across all schools for which the overall GPA was available.
- Pearson-Product-Moment-Correlation Coefficients were also calculated for each of the vocational-technical categories using the current composites.

Table 5. Frequency Distributions of Sample by School Code and USOE Cluster by Category School Code

USOE Cluster	Category	SCHOOL CODE										
		7407	7409	7410	7412	7414	7415	7417	7422	7424	7428	7430 7434
A&NR	Agriculture Hort						3				3	22
BuOf	Bus Occu						1	6				11
	Cler Pr						26				15	10 3
	Data Pr								2			5
C&M	Journalism Printing	11		8	2		9			10		
Cst	Bldg Trades										16	8
	Cab Mkg					1		2		13		
	Carpentry	25	12	12	21	2	22	2				
	Civ Tech											
	Drafting	16	3	5	11	6	17	2	2		8	8
	Masonry	20			23	5	8					
	Ptg & Dec											
	Plumbing	24	5	6	21		6					
C&H	Child Care					6		1				
	Hsehold Arts											
Envir	Conservation					1						
FA&H	Coml Art				2			3			1	
	Graphic Art						2			5	10	2
	Fash Design	21										
	Jewel/Ceram											
Health	Health Occu	14				3	15				3	
	Nursing											31
	Lab Tech						2					
Mfg	Air Cond			12	9	4	11					
	Appl Repair				9		9					
	Elec Trades	84	26	12	30	4	32	1		13		
	Electron Tr			7	17	19	23	1	22	2	22	15 13
	Ind Chem				11							
	Mach Shop	20	12	5	6	6	15			7		
	Maint Mech					2						7
	Metal Work	19		5	14		9	1	9		2	
	Oil Burner	17										
	Sm Eng Rep				1	1	6	1				
	Steam Eng											
	Tailor					17		1		17		5 9
	Welding				10		23	4				38
	Wd & Met Wrkg											
M&D	Distr Ed					3						5
PerSvc	Bldg Maint						6					
	Cook				1	6						
	Cosmetology	33		2	2			5				6
	Food Service				9			2	1		4	3 2
	Restr Mgt											

Table 5 (Cont'd)

USOE Cluster	Category	7436	7438	7442	7445	7448	7451	7452	7453	7454	7455	7457	7458	7459
Transp	Auto Svc		24	11	11	28	8	18	6	1	38	31	7	11
	Aviat Mech					17				20				
	Body & Fen Rep		8			6		19	1		2		7	
	Diesel Mech							13						
	Transp													
TOTAL FOR EACH TOTAL			336	69	85	250	94	295	39	57	107	115	166	62
A&NR	Agriculture			2	4						14			
	Hort			9					15		15			
BuOf	Bus Occu			151	36						60			
	Cler Pr			286										
	Data Pr			27				9	29		23	10	11	43
C&M	Journalism			36										
	Printing				9	19			26					8
Cst	Bldg Trades			2			14				39	4		
	Cab Mkg			1										
	Carpentry	9	52		4				41	12	29	10	1	4
	Civ Tech								13				5	
	Drafting	1	8	119	7	61			33	24	19	7	6	10
	Masonry				2					26			6	26
	Ptg & Dec	1		25										
	Plumbing	5			18				16					
C&H	Child Care			71	1									
	Hsehold Arts		51	13										
Envir	Conservation			22										
FA&H	Cml Art			3	8				21				2	
	Graphic Art			96		11	11	2				15	1	4
	Fash Design			2										
	Jewel/Ceram			29										
Health	Health Occ			5	10				33		25		20	42
	Nursing											14		
	Lab Tech				2									
Mfg	Air Cond				12				47					2
	Appl Repair								15				9	20
	Elec Trades	3	53		34	37			48	16	22	12	15	26
	Electron Tr	15	6	87	32	9	43	3	38	4	25	17	4	7
	Ind Chem								18					
	Mach Shop	16	47		4	55	10		12	23	82	6	6	13
	Maint Mech							6		14				27
	Metal Work	4			3	2	3	7	18	15		13		
	Oil Burner													
	Sm Eng Rep			52										25
	Steam Eng		14											
	Tailor			99										
	Welding		18		3	3			8	1	24		9	6
	Wd & Met Wrkg			171	14									

Table 5 (Cont'd)

USOE		7436	7438	7442	7445	7448	7451	7452	7453	7454	7455	7457	7458	7459
Cluster	Category													
M&D	Distr Ed			52					3		16	7	3	
PerSvc	Bldg Maint								24				3	
	Cook				11				2					
	Cosmetology				9				47	11	37	5	2	
	Food Service			163					11	13	15	14		13
	Restr Mgt								32				7	
Transp	Auto Svc	2	44	76	14	11	13		36	18	45	5	8	10
	Aviat Mech													
	Body & Fen Rep	1			7	3			21	13	25	6	7	3
	Diesel Mech								22					16
	Transp			10		11								
TOTAL FOR EACH		TOTAL 57	293	1609	244	222	94	27	629	190	515	145	125	305
TOTAL		6130												

III. RESULTS AND DISCUSSIONS

RESULTS: Table 6 shows the means and standard deviations for the sample used in this study and for the total sample of students tested on ASVAB-2 during the school year 1973-74. A "t" test was performed between the means for each of the subtests and composites for this study and the total sample. All "t's" were found significant at the 0.05 level. For the composites GT and CL, the means for the present sample are less than the total sample. For composites GM, EL and MM, the means for the present sample are greater than the total sample, indicating that the two samples do not come from the sample population. A test for homogeneity of variance was not performed due to the large N's involved and the assumption that each of the samples were drawn from populations considered normally distributed.

Table 7 represents a sample USOE job cluster by its categories. (The remaining USOE job clusters with similar summary data may be found in Appendix 8). Table 7 presents statistical data for the categories listed under Agribusiness and Natural Resources. N symbolizes the number of students enrolled in a particular category. R is the multiple correlation coefficient derived by correlating all nine subtests with each of the categories under their respective USOE cluster. Ho₁ indicates whether the first null hypothesis was rejected or accepted. The Current Selector Aptitude Indicator (AI) column shows the present indicator of success for each category. The next five columns show the correlation coefficients for each of the present composites with each category. The last column indicates whether or not null hypothesis 2 was accepted or rejected.

Table 8 shows the means and standard deviation in a matrix for the same USOE cluster by category by GPA and ASVAB subtests. Remaining clusters appear in the tables in Appendix 8. The number of schools from which the N for the vocational-technical category was derived is indicated at the bottom of each table.

An R was computed to test Ho₁. Refer to Ward and Jennings (1973) for procedures used in computing R. The significance of R was computed by an F test which may be found in Appendix 9. The acceptance of the first null hypothesis (Ho₁) (see Table 7) indicates the current battery will not predict better than chance success for a particular category. If the null hypothesis Ho₁ was accepted,

Table 6. Comparisons of Present Sample and Total ASVAB-2 Sample

A. Total Sample for Present Study			B. Sample Tested on ASVAB-2 During School Year 73-74		
	Mean	SD	Mean	SD	"Y"
GPA	2.61	0.95			
Subtests					
CS	44.89	14.87	48.55	14.05	19.20*
WK	12.85	4.59	13.78	4.99	15.79*
AR	11.96	5.20	13.29	5.85	19.93*
TK	12.99	6.13	10.98	6.17	25.57*
SP	13.37	5.22	13.45	5.69	1.19
MC	12.63	4.99	12.51	5.05	1.18
SI	13.05	5.71	11.60	5.48	19.81*
AI	12.25	5.64	11.48	5.20	10.65*
EI	12.68	6.40	11.16	5.68	18.54*
Composites					
GT	24.81	8.49	27.07	9.71	20.73*
CL	27.81	7.61	29.63	7.85	18.65*
GM	39.48	14.03	36.65	14.21	15.73*
EL	38.00	16.36	34.84	14.99	15.07*
MM	37.13	14.40	35.47	13.72	8.99
	N = 6130		N = 771031		

* Significant beyond the 0.05 level.

the remaining hypotheses Ho_2 , Ho_3 and Ho_4 were disregarded due to the inability of any combination of subtests to give a higher correlation than R between the predictor and criterion variables.

The second null hypothesis (Ho_2) was tested for the remaining categories. The Ho_2 column in Table 7 indicates the acceptance or rejection as tested by the F test for the current selector as indicated in the fifth column of Table 7. The F test is between R and the current composite correlation coefficient (r_c) from the appropriate column of a composite. The F test is shown in Appendix 9. This F test in Table 9-2 shows categories for which the current composite will predict as well as R. This is indicated by "No" in the last column. "Yes" in the last column indicates the categories for which the current composite will not predict as well as R. This would indicate that a different composite could be formed to increase the predictive power of the battery. For those categories where Ho_2 was not rejected, the current predictor composite should continue to be used.

Table 7. Analysis Summary
(Sample for Agribusiness and Natural Resources Job Cluster)

Category	N	R	Ho_1	Current Selector	GT	CL	GM	EL	MM	Ho_2
				AI	r	r	r	r	r	
Agriculture	23	0.64	Accepted	GT	0.24	0.09	0.37	0.12	0.30	(Not Tested)
Horticulture	64	0.54	Rejected	GT	0.33	0.35	0.13	0.02	0.06	Accepted

*Table 8. Means and Standard Deviations for ASVAB Subtests and GPA
(Sample for Agribusiness and Natural Resources Job Cluster)*

Variable	Agriculture		Horticulture	
	M	SD	M	SD
GPA	2.40	0.89	2.77	1.03
CS	43.78	11.26	44.39	13.65
WK	12.61	4.30	13.31	3.92
AR	10.74	4.19	9.59	5.71
TK	13.87	4.48	10.94	5.62
SP	11.30	5.09	12.42	5.21
MC	11.65	4.77	11.72	4.49
SI	15.30	5.59	10.05	5.61
AI	13.87	3.53	9.72	4.40
EI	13.22	4.51	10.00	5.71
Number of Schools	4		5	

Table 9 gives the 16 categories that were tested by null hypothesis 3 (H_{03}) and null hypothesis 4 (H_{04}). H_{03} and H_{04} relate to whether or not a composite of two or three subtests could be formed that would predict as well as the full battery (R) and significantly better than the current composite (r_{cc}) in each of the 16 categories. The columns in Table 9 are described in sequence from the first column to the last column. The 16 categories rejected by H_{02} , the current selector AI for each of the 16 categories, the current correlation coefficient (r_{cc}) for each of the current selector AIs, the multiple

Table 9. Courses Where Proposed Selector AI Recommended

Category	Current Selector AI	r_{cc}	R	Proposed Selector AI	r_{nc}	H_{03}	H_{04}
Business Occupations	CL	0.36	0.43	AR+WK+1/5CS	0.42	Rejected	Rejected
Clerical Practices	CL	0.31	0.43	AR+WK+1/5CS	0.39	"	"
Data Processing	EL	0.27	0.41	SP+MC+EI	0.33	"	"
Journalism	GT	0.48	0.80	AR+SP	0.71	"	"
Drafting	GT	0.33	0.44	AR+SP	0.40	"	"
Masonry	GM	-0.06	0.43	SP+TK+1/3CS	0.23	"	"
Painting & Decorating	GM	0.05	0.78	GT	0.66	"	"
Plumbing	GM	0.28	0.48	AI+TK+1/3CS	0.42	"	"
Graphic Art	GT	0.20	0.45	AR+SP	0.34	"	"
Health Occupations	GT	0.37	0.55	CL	0.51	"	"
Electrical Trades	EL	0.34	0.41	AR+TK+EI	0.37	"	"
Electronic Trades	EL	0.14	0.31	AR+TK+EI	0.28	"	Accepted
Machine Shop	GM	0.22	0.36	TK+AI	0.33	"	Rejected
Tailor	GT	0.56	0.68	AR+SP+1/5CS	0.65	"	"
Food Service	GT	0.25	0.43	CL	0.37	"	"
Auto Service	MM	0.38	0.46	AI+TK+1/3CS	0.44	"	"

correlation coefficient (R), the proposed selector AI for each of the 16 categories, the correlation coefficients for the proposed selector AI and the last two columns indicate whether or not H_{o3} or H_{o4} were rejected or accepted. The tests for significance will be found in Appendix 9.

In three categories (Painting and Decorating, Health Occupations and Food Service) a present composite, different from the current selector, predicted as well as the full battery. Refer to Appendix 1 for the definitions of GT and CL. For the remaining 13 categories, a new composite is proposed because its predictive ability is higher than the current composite. For instance, the present composite for plumbing is GM with a correlation of 0.28 (r_{cc}) with the criterion. The proposed composite has a correlation with plumbing of 0.42 (r_{nc}) which is significantly higher than r_{cc} but not significantly different from R (0.48).

Table 10 shows the distribution of the vocational-technical courses as separated by the hypotheses. The total column indicates the number of vocational-technical categories by USOE cluster. The following four columns indicate how many of the courses accepted a null hypothesis. The row for sample N shows the number of students associated with total number of categories in the study.

Table 11 presents a matrix showing the correlation between ASVAB-2 results and total GPA. Since all schools did not have total GPA, only schools were used where total GPA was available. A mean, standard deviation and correlation coefficient is presented for each subtest and composite for ASVAB-2 and GPA. The N and multiple correlation coefficient are shown at the bottom of the table. This N reflects sample loss due to lack of total GPA.

DISCUSSIONS: Table 6 shows a significant difference between the means of the study sample and the total sample. The significant difference could have been attained for a number of reasons: (a) the sample used in the present study was not a random sample of those tested during school year 1973-74, (b) the sample on ASVAB-2 in the present study was comprised of mostly males (80%) in contrast to the total sample which was 60% males, (c) the sample in the present study was restricted to

Table 10. Number of Categories by USOE Cluster Separated by the Hypothesis

Cluster	H_{o1} Accepted	H_{o2} Accepted	H_{o3} Accepted	H_{o4} Accepted	Total
Agri-business & Natural Resources	1	1	0	0	2
Business & Office	0	0	3	0	3
Communications & Media	1	0	1	0	2
Construction	3	1	4	0	8
Consumer & Homemaking	2	0	0	0	2
Environment	1	0	0	0	1
Fine Arts & Humanities	3	0	1	0	4
Health	1	1	1	0	3
Manufacturing	4	6	4	0	14
Marketing & Distribution	1	0	0	0	1
Personal Services	3	1	1	0	5
Transportation	2	2	1	0	5
Total Number of Courses	22	12	16	0	50
Sample N's	915	1352	3863	468	6130

Table 11. Correlation of ASVAB-2 With Total GPA Scores

	Mean	S.D.	r
GPA	2.20	0.81	
CS	45.05	15.05	0.23
WK	12.96	4.54	0.31
AR	12.15	5.21	0.34
TK	12.67	6.21	0.05
SP	13.45	5.60	0.23
MC	12.55	5.08	0.19
SI	12.73	5.78	0.10
AI	11.75	5.73	0.09
EI	12.37	6.63	0.19
Composites			
EL	37.28	16.96	0.20
GM	38.90	14.66	0.16
MM	36.04	15.02	0.13
CL	27.98	7.62	0.34
GT	25.11	8.49	0.37

Multiple R = 0.40

N = 4748

certain locations, see Figure 1, and (d) the sample in the present study came from only vocational-technical schools in comparison to the global distribution of schools found in the total sample.

Again referring to Table 6, the differences found between the group of GT and CL and the group of GM, EL and MM composite means could be accounted for by several factors. One, the sample in the present study may have a strong affinity for the vocational-technical areas. Although no data is available to substantiate it, the sample could have interests compatible with non-academic endeavors; they are not as academically achievement-oriented as they are vocationally-oriented and are, therefore, interested in achieving in areas which preclude further schooling. Secondly, these students may be in an education tract which is designed to facilitate performance in a post-high school job. These tracts often are directed to the practical applications of high school courses rather than to the academically-oriented courses of college. In addition, consideration ought to be given to what effects locus of control (Rotter, 1966) has on the performance of students from schools that differ both in philosophy and methods of goal attainment within an educational system (i. e., a definite interaction exists between achievement and the demands of the environment).

Since R is the best predictor of a battery for a particular course, the acceptance of the first null hypothesis (H_{01}) (Table 7 for example in Agribusiness and Natural Resources) implies that ASVAB-2 does not have the predictive ability for success in that course. Caution ought to be used when making assumptions about the lack of ASVAB-2 predictability in those areas of acceptance. The insensitivity of ASVAB-2 to predict in those areas of acceptance could be a result of insufficient data gathered from the vocational-technical schools, i.e., composition and size of N's sampled within a category.

In testing H_{02} , the current composite (r_{cc}) was compared with R for a significant difference in those areas of ASVAB-2 which appeared to predict success for certain categories. As indicated in Appendix 9-2, 12 of the current composites measured success in their respective categories at a level

comparable with R. This is indicated by the "No" in the last column. Where a current composite measured success in a particular category, a visual examination of the correlations, shown in the sixth through the ninth columns of Table 7, and counterparts in Appendix 9, indicates very little difference between the selector composite and some of the remaining composites; i. e., horticulture selector is GT with $r = 0.33$ and CL has $r = 0.35$. This may imply that for these vocational categories, the present subtests and/or composite may not be robust enough to predict success for these courses. In some instances, (i. e., Business Occupations, Plumbing, Painting and Decorating, Data Processing) where H_{02} was rejected (Appendix 9-2), the rejection may be too stringent because of sample composition within these categories. These types of data should be considered when selections are made.

The results of H_{03} indicate a two or three subtest composite can be formed to predict as well as the total battery. These same composites were all significantly better than the current composite except for the electrical trades category (i. e., H_{04} accepted). However, because the new composite's correlation coefficient (0.37) was not significantly different than the multiple correlation coefficient (0.41), the new composite should be used for predicting success in the electrical trades category. Thus, though the predictive power has been significantly increased, there may have been a loss in differential capability. The names associated with the subtests making up the proposed composites cannot in all cases be directly associated with the vocational-technical category they predict. This gives some indication the subtest may be measuring a factor not indicated by its name. Though it would appear the subtests have "face validity" they do not measure a single identifiable factor and indeed appear complex in nature. Prior to accepting the proposed composites for use in a particular school instead of the current composite, it is recommended that consideration be given to the above mentioned factors and that school statistics be compared to those in Tables 4 and 5. Where there are differences between the school population and the study sample, there could well be differences in what constitutes the best composite for prediction.

The data collected from the 18 schools which had the overall grade point average (GPA) for their students is summarized in Appendix 10. The table shows the correlation between GPA and the ASVAB-2 (Multiple R) and the correlation between the General Technical composite (GT) and GPA.

The first column of Appendix 10 identifies the participating schools by code number. The second column (N) indicates the sample size for each school. In several cases, this N differs from the total school N in Table 5. There are two reasons. First, the overall GPA was not reported for a few students and, second, a few students were in vocational courses too small to analyze. The third and fourth columns show the mean GPA and standard deviation (SD), respectively. The fifth column shows the multiple correlation coefficients that were computed indicating the relationship between ASVAB-2 and the GPA criterion. The sixth and seventh columns show means and SDs, respectively, for the GT scores of the Ns. The last column shows the correlation coefficients derived between the GT composite and GPA criterion.

The correlation between the ASVAB-2 and GPA means are affected by several factors such as the size of N, the differences in grading between academic courses and vocational-technical courses, some schools may emphasize a relatively homogenous vocational-technical course curriculum, etc. Sufficient data is not available at present to identify specific factors which contribute to the known variance. Such decisions are left to the individual schools identified by code numbers for reasons mentioned above.

CONCLUSIONS: An analysis of the data resulted in the following conclusions:

a. It appears that, regardless of the significance of the aptitudes evaluated and the measures of attainment used as the criterion, less than half of the variance of the criterion will be associated with the independent variable. This is a finding one might expect in any validity (Ghiselli, 1966) partially as a function of criterion contamination. Some reasons for this include:

1. Factors which contribute to success, as measured by the criterion, may not be found in Form 2 of the ASVAB.

2. The degree of reliability of Form 2 of the ASVAB would cause some of the variance difference.

3. The secondary school's grading practices would cause the criterion variable to assume a degree of unreliability.

b. Aptitudes measured in Form 2 of the ASVAB may not be indigenous to the ability fields being measured. That is, various subtests may measure factors not indicated by their name.

c. In the categories where Form 2 of the ASVAB did not appear to predict success, further research is necessary to determine what confounding variables are contributing to the unknown variance determined by R^2 .

For those 22 courses where the total battery (R) did not demonstrate predictive ability, lack of prediction could have been attained for a number of reasons. A contributory factor could have been small sample size. Additionally, the battery might not have been sensitive enough to discriminate in those courses that reflect a diversity of goals, or in courses where a number of different aptitudes may be required. There also may be a lack of commonality between what civilian educators consider basic to training for a particular job and what the military is looking for in a person to train for a similar job within the services. In other words, civilian vocational-technical courses may be more specific in a particular course as compared to the military who are looking for people with a certain level of general ability.

In commenting on the results obtained in this study, it must be noted that they derive from a particular school setting and may not be generalized to other types of educational institutions. The results of the study emphasize the heuristic value of separating abilities into subcategories reflective of diverse psychological demands.

SUMMARY: The purpose of this study was to present data showing relationships between Form 2 of the ASVAB and the criterion variable of GPA for high school vocational-technical courses. To accomplish this purpose, a sample of the vocational-technical population was assessed on Form 2 of the ASVAB as well as on secondary vocational-technical school criterion.

Previous studies were performed utilizing Form 1 of the ASVAB with the subjects being Air Force trainees or Navy trainees. Although such studies are acceptable, they may not have represented samples from the high school population. This study took high school students who were currently enrolled in a vocational-technical program rather than a sample of students from the high school population at large. Such a sample is conceivable more oriented toward the frame of reference of success within the military services. This is not to say that the larger sample of high school students are less success-oriented in the service. On the contrary, those students in the vocational-technical areas might perform better than other students in areas of technical expertise.

Therefore, the study was conducted within the hypothesized frame of reference of the armed services' concept of aptitude which is purported to identify young people who are eligible for entrance into the military services. This concept appears to follow a theory correlating job selection with a reasonable chance of success in areas of selection.

A correlational analysis was used to test four null hypotheses (Guilford, 1965). The results of the analysis indicated that several of the present composites could adequately predict as well as the

whole battery (R) in certain courses while other composites did not appear to do as well. New composites were formulated that could predict as well as the full battery (R).

Summary Table 12 contains statistical data for the null hypotheses. The first column is the name of the vocational-technical category. The column labeled R is the multiple regression correlation coefficient which gives the relationship between the nine subtests of Form 2 of the ASVAB and each of the vocational-technical categories. The third column shows the N size for each of the vocational-technical categories. The fourth column, marked current Selector AI, gives the current composite for a particular category. The fifth column labeled r_{cc} gives the current correlation coefficient for each current Selector AI. The sixth column shows the proposed Selector AI chosen from the present composite

Table 12. Summary Table

Category	R	N	Current Selector AI	r_{cc}	Proposed Selector AI	r_{nc}	Null Hypothesis Accepted
Agriculture	0.64	23	GT	0.24	—	—	Ho ₁
Horticulture	0.54	64	GT	0.33	GT	0.33	Ho ₂
Business Occupations	0.43	265	CL	0.36	AR+WK+1/5CS	0.42	Ho ₃
Clerical Practices	0.43	340	CL	0.31	AR+WK+1/5CS	0.39	Ho ₃
Data Processing	0.41	159	EL	0.27	SP+MC+EL	0.33	Ho ₃
Journalism	0.80	36	GT	0.48	SP+MC+EL	0.71	Ho ₃
Printing	0.33	94	GM	0.09	—	—	Ho ₁
Building Trades	0.34	83	GM	0.27	—	—	Ho ₁
Cabinet Making	0.89	17	GM	-0.60	—	—	Ho ₁
Carpentry	0.33	258	GM	0.22	GM	0.22	Ho ₂
Civil Technology	0.89	18	GT	0.23	—	—	Ho ₁
Drafting	0.44	373	GT	0.33	AR+SP	0.40	Ho ₃
Masonry	0.43	116	GM	-0.06	TK+SP+1/3CS	0.23	Ho ₃
Painting & Decorating	0.78	26	GM	0.05	GT	0.66	Ho ₃
Plumbing	0.48	101	GM	0.28	AI+TK+1/3CS	0.43	Ho ₃
Child Care	0.39	79	GT	0.22	—	—	Ho ₁
Household Arts	0.35	64	GT	0.22	—	—	Ho ₁
Conservation	0.55	23	GT	0.36	—	—	Ho ₁
Commercial Art	0.62	40	GT	0.39	—	—	Ho ₁
Graphic Art	0.45	159	GT	0.20	AR+SP	0.34	Ho ₃
Fashion Design	0.79	23	GT	0.31	—	—	Ho ₁
Jewelry & Ceramics	0.69	29	GT	0.20	—	—	Ho ₁
Health Occupations	0.55	170	GT	0.30	CL	0.51	Ho ₃
Nursing	0.79	31	GT	0.56	GT	0.56	Ho ₂
Laboratory Technician	0.70	18	GT	-0.07	—	—	Ho ₁
Air Conditioning	0.35	97	GM	0.19	—	—	Ho ₁
Appliance Repair	0.62	62	GM	0.42	GM	0.42	Ho ₂
Electrical Trades	0.41	468	EL	0.34	AR+TK+EL	0.37	Ho ₃
Electronic Trades	0.31	431	EL	0.14	AR+TK+EL	0.28	Ho ₃ & Ho ₄
Industrial Chemistry	0.55	29	GT	-0.03	—	—	Ho ₁
Machine Shop	0.36	345	GM	0.22	TK+AI	0.33	Ho ₃
Maintenance Mechanic	0.66	56	GM	0.40	GM	0.40	Ho ₂
Metal Working	0.38	124	GM	0.25	GM	0.25	Ho ₂
Oil Burner Repair	0.86	17	GM	-0.04	—	—	Ho ₁
Small Engine Repair	0.51	86	MM	0.34	MM	0.34	Ho ₂

Table 12 (Cont'd)

Category	R	N	Current Selector AI	r_{cc}	Proposed Selector AI	r_{nc}	Null Hypothesis Accepted
Steam Engineering	0.70	14	GM	0.27	—	—	Ho ₁
Tailor	0.68	148	GT	0.56	AR+SP+1/5CS	0.64	Ho ₃
Welding	0.56	147	GM	0.49	GM	0.49	Ho ₂
Wood & Metal Working	0.34	181	GM	0.22	GM	0.22	Ho ₂
Distributive Education	0.37	89	GT	0.24	—	—	Ho ₁
Building Maintenance	0.43	33	GM	0.24	—	—	Ho ₁
Cook	0.76	20	GT	0.68	—	—	Ho ₁
Cosmetology	0.46	159	GT	0.37	GT	0.37	Ho ₂
Food Service	0.43	250	GT	0.25	CL	0.37	Ho ₃
Restaurant Management	0.63	39	GT	0.25	—	—	Ho ₁
Auto Service	0.46	476	MM	0.38	AI+TK+1/3CS	0.44	Ho ₂
Aviation Mechanics	0.55	37	MM	0.29	—	—	Ho ₁
Body & Fender Repair	0.42	129	MM	0.24	MM	0.24	Ho ₂
Diesel Mechanics	0.56	51	MM	0.36	MM	0.36	Ho ₂
Transportation	0.69	21	MM	0.14	—	—	Ho ₁

or indicated by a new formula derived from the regression analysis. The correlation coefficient of this composite follows in the seventh column. The eighth column indicates the acceptance of the null hypotheses for each of the categories.

Of the 50 categories on the total sample, prediction of performance in 22 categories could not be demonstrated by any combination of the ASVAB subtests. It is to be noted that each N of these 22 categories is relatively small; they represent only 15% of the overall sample. For the remaining 28 categories, representing 85% of the sample, the battery did predict course performance at a significant level ($p = 0.05$).

For 12 of the remaining 28 categories, the current Selector AI was found to predict as well as the multiple R. This is indicated in the last column by the symbol Ho₂. This means that the current Selector AI is the best group of subtests that can predict as well as the full battery. For example, the proposed Selector AI (GT) for Horticulture is the same as the current Selector AI, which, in turn, means that GT is the best composite for predicting success in this category.

Two other hypotheses that were tested related to whether or not a new composite could be formed that would predict as high as the multiple correlation (R) for the battery and better than the current composite (r_{cc}). This was performed for the remaining categories (16). If a new composite could be formed, it was tested against the old composite for a significant difference. The entry of Ho₃ in the last column indicates the 16 new composites could be formed that could predict as well as the full battery (R). The last hypothesis examined tested whether or not the new composite (r_{nc}) could predict significantly better than the current composite (r_{cc}). Of these 16 categories, only the Electronic Trades proposed AI failed to predict course success better than the current AI (EL). This is indicated in the last column by the symbol Ho₄.

A general conclusion from this study indicates that, for the most part, Form 2 of the ASVAB does do well in predicting success in a number of vocational-technical categories. For those categories where Form 2 of the ASVAB does not appear to predict well, further exploration is needed to delineate the ability factors necessary for academic success in those categories.

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Appendix 1

Test in the Armed Services Vocational

Aptitude Battery (ASVAB)

1. Coding Speed (CS). In this test there is a key and 100 items. The key is a group of words with a code number for each word. Each item presents one word for which the examinee indicates the code number.
2. Word Knowledge (WK). Each item requires the examinee to select the correct synonym for a specific word.
3. Arithmetic Reasoning (AR). Each item is a reasoning problem involving application of the arithmetic process.
4. Tool Knowledge (TK). Each item presents five drawings of various tools or shop equipment. The examinee indicates which of the four alternative drawings goes best with the lead drawing.
5. Space Perception (SP). Each item consists of five drawings, a pattern and four boxes. The question to be answered is which one of the boxes can be made by folding the pattern.
6. Automotive Information (AI). Each item asks a question about the identification or operation of automobile parts.
7. Shop Information (SI). This test has questions about shop practices and the use of tools. Many of the items contain drawings.
8. Mechanical Comprehension (MC). Each item includes a drawing, or drawings, illustrating some physical principle and a question.
9. Electronic Information (EI). This test has questions about elementary principles of electricity and about electrical/electronic devices, drawings and equipment.

General-Technical—describes the student's ability for occupations requiring academic ability. The composite is composed of verbal and mathematical components of the battery.

Clerical—describes the student's ability relevant to clerical and administrative occupations. The composite is composed of the battery components concerned with verbal ability and clerical speed and accuracy.

Electronics—describes the student's ability relevant to electrical and electronic occupations. The composite consists of tests dealing with electrical information and with understanding of mechanical principles.

General Mechanics—describes the student's ability in terms of those capabilities relevant to a variety of mechanical and trade jobs. The composite consists of tests assessing shop information and spatial ability.

Motor Mechanics—describes the student's ability relevant to engine repair and other related jobs. It is composed of measures of automotive information and understanding of mechanical principles.

These composites were used for the 1973-1974 school year; as the composites change, additional information will be provided to counselors through your armed services representative.

Appendix 2

Comparative Statistics for the ASVAB and BTB Tests Against a Standardized Final School Grade Criterion for a Combined School Sample (N=18,313 from 47 Schools)

ASVAB										BTB					
Test	WK	AR	TK	Intercorrelations					Validity		Test	Validity			
				SP	MC	SI	AI	EI	r	r _c		r	r _c		
WK	—	.55	.23	.39	.43	.36	.38	.51	.22	.29	GCT	.35	.45		
AR		—	.16	.45	.42	.27	.31	.43	.35	.42	ARI	.37	.47		
TK			—	.34	.44	.69	.69	.51	.12	.15	MECH	.22	.31		
SP				—	.49	.37	.35	.42	.23	.30					
MC					—	.49	.50	.55	.28	.35	MECH	.22	.31		
SI						—	.65	.58	.19	.26	SHOP	.24	.33		
AI							—	.59	.19	.25					
EI								—	.30	.36	ETST	.45	.55		
Mean	22.15	19.85	18.87	19.05	18.74	18.27	18.11	18.92	R =	.40		R =	.48		
SD	3.07	3.86	3.70	3.48	2.96	3.29	4.71	3.55	R _c =	.47		R _c =	.57		
Beta	-.0636	.2582	-.0755	.0277	.1082	.0333	-.0018	.1716							
Four Best ASVAB Linear Composites								Four Best BTB Linear Composites							
Composite				r		r _c		Composite				r		r _c	
AR+EI				.39		.45		ARI+ETST				.46		.56	
AR+MC				.38		.45		GCT+ETST				.44		.54	
AR+SI				.35		.42		ETST+SHOP				.42		.52	
AR+SP				.35		.42		MECH+ETST				.41		.52	

Appendix 3

Validity of Armed Services Vocational Aptitude Battery, Form 1, to Predict Technical School Success (Vitola, Mullins & Croll, 1973)

Table 3-1. ASVAB Validities for Technical School Courses in the General Cluster

Table 3-2. ASVAB Validities for Technical School Courses in the Administrative Cluster

Table 3-3. ASVAB Validities for Technical School Courses in the Mechanical Cluster

Table 3-4. ASVAB Validities for Technical School Courses in the Electronics Cluster

Table 3-1. ASVAB Validities for Technical School Courses in the General Cluster^a

Course	Minimum AI	N	Aptitude Index Validities							
			Mechanical		Administrative		General		Electronics	
			r	r _c	r	r _c	r	r _c	r	r _c
3ABR20630 Imagery Interpreter Specialist	80	116	.37	.78	.30	.80	.42	.86	.43	.84
3ABR25231 Weather Observer	80	99	.32	.81	.39	.79	.35	.84	.34	.81
3ABR27230 Air Traffic Control Operator	60	156	.21	.50	.32	.59	.42	.68	.39	.67
3ABR27330 Aircraft Control & Warning Operator	60	133	.30	.55	.38	.66	.66	.83	.55	.77
3AQR90010 Medical Service Fundamentals	60	401	.45	.69	.56	.77	.69	.84	.61	.80
3ABR90230 Medical Service Specialist	60	50	.45	.70	.41	.67	.63	.84	.55	.77
3ABR92230 Protective Equipment Specialist	40	60	.53	.66	.26	.45	.42	.69	.37	.56
3ABR63130 Fuel Specialist	40	150	.34	.45	.34	.46	.42	.54	.38	.50
3ABR81130 Security Specialist	40	707	.45	.60	.45	.62	.58	.72	.56	.70

^aValidities reported uncorrected (r) and corrected for restriction of range (r_c).

Table 3-2. ASVAB Validities for Technical School Courses in the Administrative Cluster^a

Course	Minimum AI	N	Aptitude Index Validities							
			Mechanical		Administrative		General		Electronics	
			r	r _c	r	r _c	r	r _c	r	r _c
3ABR29130 Communications Center Specialist	60	215	.33	.45	.42	.64	.42	.62	.43	.61
3AQR29222 Printer Systems Operator, Prep	60	91	.14	.28	.34	.50	.35	.46	.34	.48
3ABR29231 Morse Systems Operator	60	84	.01	.24	.28	.57	.25	.50	.22	.51
3ABR29330 Ground Radio Operator, Voice	60	215	.08	.21	.25	.38	.22	.35	.15	.29
3ABR64530 Inventory Management Specialist	60	789	.27	.49	.48	.75	.47	.71	.46	.68
3ABR67133 Disbursement Accounting Specialist	80	122	.11	.27	.32	.37	.21	.25	.22	.25
3ABR73230 Personnel Specialist	60	262	.42	.63	.63	.86	.62	.82	.62	.81

^aValidities reported uncorrected (r) and corrected for restriction of range (r_c).

Table 3-3. ASVAB Validities for Technical School Courses in the Mechanical Cluster^a

Course	Minimum AI	N	Aptitude Index Validities							
			Mechanical		Administrative		General		Electronics	
			r	r _c	r	r _c	r	r _c	r	r _c
3ABR42132 Aircraft Pneudraulic Repairman	40	115	.49	.62	.25	.41	.48	.61	.48	.61
3ABR42430 Aircraft Fuel Systems Mechanic	40	66	.13	.29	.37	.39	.43	.47	.45	.50
3ABR43131-A Aircraft Maintenance Specialist (Reciprocating Engine)	40	238	.52	.67	.50	.61	.54	.69	.58	.71
3ABR43131-C Aircraft Maintenance Specialist (Jet, 1 and 2 Engines)	40	691	.38	.55	.34	.43	.40	.54	.37	.53

Table 3-3 (Cont'd)

Course	Minimum AI	N	Aptitude Index Validities							
			Mechanical		Administrative		General		Electronics	
			r	r _c	r	r _c	r	r _c	r	r _c
3ABR43131-E Aircraft Maintenance Specialist (Jet, over 2 Engines)	40	302	.47	.63	.27	.39	.42	.57	.46	.62
3ABR43131-F Aircraft Maintenance Specialist (Turbo-prop)	40	271	.48	.66	.31	.41	.47	.64	.47	.62
3ABR43230 Jet Engine Mechanic	40	485	.45	.61	.38	.51	.49	.59	.42	.54
3ABR44330 Missile Mechanic	50	53	.50	.67	.46	.59	.60	.73	.64	.77
3ABR46130 Munitions Maintenance Specialist	60	73	.31	.55	.43	.59	.58	.73	.38	.61
3ABR46230 Weapons Mechanic	60	345	.27	.53	.26	.43	.35	.52	.31	.53
3ABR47330 Vehicle Repairman, GP	40	52	.73	.82	.55	.68	.68	.79	.71	.81
3ABR53430 Airframe Repair Specialist	40	150	.55	.70	.46	.59	.47	.63	.56	.69
3ABR53530 Corrosion Control Specialist	50	51	.54	.71	.57	.73	.82	.88	.66	.78
3ABR54330 Electrical Power Production Specialist	50	120	.54	.64	.35	.48	.49	.60	.52	.62
3ABR60531 Air Cargo Specialist	50	170	.43	.55	.36	.46	.48	.58	.42	.55
3ABR60730 Aircraft Loadmaster	50	83	.38	.59	.49	.63	.69	.80	.58	.73

*Validities reported uncorrected (r) and corrected for restriction of range (r_c).

Table 3-4. ASVAB Validities for Technical School Courses in the Electronics Cluster^a

Course	Minimum AI	N	Aptitude Index Validities							
			Mechanical		Administrative		General		Electronics	
			r	r _c	r	r _c	r	r _c	r	r _c
3ABR30130 Aircraft Radio Repairman	80	114	.29	.78	.38	.78	.41	.84	.52	.86
3ABR30131 Aircraft Electronic Navigation Equipment Repairman	80	138	.17	.58	.15	.60	.22	.76	.32	.82
3ABR30133 Electronic Warfare Repairman	80	62	.37	.79	.16	.68	.21	.78	.38	.82
3ABR30134 Aircraft Inertial and Radar Navigator Systems Repairman	80	71	.33	.75	.26	.27	.39	.84	.39	.85
3ABR30430 Radio Relay Equipment Repairman	80	61	.42	.84	.16	.19	.22	.62	.38	.85
3ABR30434 Ground Radio Communications Equipment Repairman	80	70	.44	.86	.25	.68	.33	.81	.43	.87
3ABR30630 Electronic Communications and Cryptographic Equipment Systems Repairman	80	50	.03	.34	.20	.31	.19	.58	.27	.64
3ABR30730 Telecommunications Control Specialist/Attendant	80	82	.41	.82	.41	.83	.42	.83	.43	.84
3ABR32231-A Weapons Control Systems Mechanic	80	60	.16	.68	.19	.71	.18	.69	.16	.75
3ABR36330 Communications and Relay Center Equipment Repairman, Elec/Mech	60	52	.30	.56	.19	.43	.33	.63	.43	.69
3ABR40230 Aerospace Photographic Systems Repairman	60	66	.26	.38	.20	.37	.27	.58	.27	.59
3ABR42133 Aerospace Ground Equipment Repairman	60	208	.57	.80	.34	.60	.50	.79	.59	.83
3ABR42230 Instrument Repairman	40	68	.32	.62	.30	.49	.36	.65	.39	.67
3ABR42330 Aircraft Electrical Repairman	40	134	.35	.56	.38	.60	.41	.62	.42	.64

*Validities reported uncorrected (r) and corrected for restriction of range (r_c).

Appendix 4

DEPARTMENT OF THE AIR FORCE
AIR FORCE HUMAN RESOURCES LABORATORY (AFSC)
LACKLAND AIR FORCE BASE, TEXAS 78236

Dear Sir

During the past two school years, approximately one million high school students were tested on the Armed Services Vocational Aptitude Battery (ASVAB) each year. Acutely aware of the considerable impact of this high school testing program, the armed services have recognized the need to conduct an extensive validation study to determine the utility of the ASVAB in the context of the types of training programs which vocational-technical high schools provide in addition to validation for service technical courses.

_____ is one of fifteen vocational-technical schools which are being invited to participate in the ASVAB validation research. As your school kindly permitted a representative of the armed services to administer the ASVAB to its students, we wish to obtain information on the names and final grades in Vocational-Technical courses in which the ASVAB-tested students were enrolled during the past 2 years. We would emphasize that student names are required *only* for the purpose of matching the students' test scores with the final course grades. Immediately upon completion of the study, *all* student identification will be destroyed. The fact that the Personnel Research Division is solely a research facility must be stressed as we in no way serve as a recruiting or organizing agency. Our singular consideration is with the assessment of the validity of the ASVAB and the confidentiality of any data received will be rigidly maintained.

Should your school desire to assist us with the validation of the ASVAB, and in providing necessary data, please let us know and we will have someone visit you to discuss what is needed, its purpose, and to assist in transcribing data. Additionally, upon completion of the study, we would be pleased to provide your school with a copy of the final research report with specific information regarding the assessment of the ASVAB's validity as it relates to the students in your school only. The report should be a most informative tool in your vocational counseling program.

We thank you for any consideration given to our request and look forward to hearing from you.
Sincerely

LELAND D. BROKAW, Chief
Personnel Research Division

Appendix 5

Procedures for Telephone Conversation

1. Have they received the attached letter from AFHRL. The letter outlines what we are doing and what we are requesting from each school. If the school has not received the letter, I feel we ought to advise the school officials we will call back in a few days to give them an opportunity to peruse the letter and assimilate questions.
2. If they have received the letter:
 - a. Are they receptive to the project?
 - b. Will they participate in the project?
 - c. We prefer the following in the stated order. If one has accepted, do not mention d or e.
 - d. If they will participate—will they collect the data for us if we send it to them?
 - e. If not, will they allow a test administrator to go in and collect the data?
 - f. If not, will they allow a member from AFVTG to go in and collect the data?
 - g. If “no” to all of the above—“ADIOS”.
 - h. If “yes” to any one of the above—we will make arrangements as follows:
 - (1) For d, we will send the information blank required—stress time is of the essence.
 - (2) For e, we will contact the appropriate person.

School Name

Number Code	Student Name	SSAN	Race	GPA	Voc/Tech Grade	Voc/Tech Cat Course or Area
000000	John Doe	1604-08-326	Cau	Ltr Grd point Percentile	B	Agri.

Appendix 6
Telephone Instructions for Calls to Test Administrators

1. Explain the study to the TA.

a. Purpose: To conduct an extensive validation study to determine the utility of the ASVAB in the context of the types of training programs which vocational-technical high schools provide. Each school has already verbally agreed to participate.

b. Information desired:

(1) Names and final grades in vocational-technical courses in which the ASVAB-tested students were enrolled during the past two years.

(2) Emphasize that student names are required only to match student test scores with student grades. Immediately after this matching is completed, all student identification will be destroyed.

c. What AFVTG will provide to each participating school:

(1) Blank forms for each student who took the ASVAB. Information desired from student transcripts will be transferred to proper blanks on the forms.

(2) A copy of our final research report as soon as it is completed.

(3) Specific information on the ASVAB's validity as it relates to each particular school.

2. Explain the procedures the TA is to follow:

a. Receive explanatory letter and required forms. Stress that only the test administrator to whom the letter is addressed is to have any access at all to the forms.

b. Contact the school and set up an appointment.

c. Visit the school and collect the data.

d. Return forms to AFVTG.

(1) Must use either certified or registered mail.

(2) No one but the person who gathered the data is to be allowed to view it before mailing.

(3) Should be done as expeditiously as possible.

3. Ask TA for questions he might have (if he does and you are not positive of the answer—write down the question, tell him he will be called back and give the information to Lt Moll, Dr. Lewis, LTC Bower, Mr. Krockover or Capt Armstrong).

4. Check the TA's name and mailing address to insure that we send forms to the correct address.

Appendix 7
USOE Job Clusters

Agri-Business and Natural Resources
Business and Office
Communications and Media
Construction
Consumer and Homemaking
Environment
Fine Arts and Humanities
Health
Hospitality and Recreation
Manufacturing
Marine Science
Marketing and Distribution
Personal Services
Public Service
Transportation

Appendix 8

Analysis Summaries and Mean and Standard Deviation Tables for ASVAB Subtests and GPA (By USOE Job Cluster)

Table

8-1	Analysis Summary—Business and Office
8-2	Means & Standard Deviations—Business & Office
8-3	Analysis Summary—Communications & Media
8-4	Means and Standard Deviations—Communications & Media
8-5	Analysis Summary—Construction
8-6	Means and Standard Deviations—Construction
8-7	Analysis Summary—Consumer & Homemaking
8-8	Means and Standard Deviations—Consumer & Homemaking
8-9	Analysis Summary—Environment
8-10	Means and Standard Deviations—Environment
8-11	Analysis Summary—Fine Arts & Humanities
8-12	Means and Standard Deviations—Fine Arts & Humanities
8-13	Analysis Summary—Health
8-14	Means and Standard Deviations—Health
8-15	Analysis Summary—Manufacturing
8-16	Means and Standard Deviations—Manufacturing
8-17	Analysis Summary—Marketing & Distribution
8-18	Means and Standard Deviations—Marketing & Distribution
8-19	Analysis Summary—Personal Services
8-20	Means and Standard Deviations—Personal Services
8-21	Analysis Summary—Transportation
8-22	Means and Standard Deviations—Transportation

Table 8-1. Analysis Summary
(Business and Office)

Category	N	R	Ho ₁	Current Selector AI	GT r	CL r	GM r	EL r	MM r	Ho ₂
Business Occupation	265	0.43	Rejected	CL	0.36	0.36	0.12	0.18	0.19	Rejected
Clerical Practices	340	0.43	Rejected	CL	0.37	0.31	0.10	0.23	0.20	Rejected
Data Processing	159	0.41	Rejected	EL	0.25	0.26	0.21	0.27	0.21	Rejected

Table 8-2. Means and Standard Deviations

Variable	Business and Office					
	Business Occupations		Clerical Practices		Data Processing	
	M	SD	M	SD	M	SD
GPA	2.82	.98	2.50	.98	3.06	1.03
CS	56.51	13.88	53.90	15.04	50.94	13.62
WK	13.32	4.56	13.73	3.91	14.37	4.25
AR	11.34	4.93	11.82	4.45	14.21	5.29

Table 8-2 (Cont'd)

Variable	Business and Office					
	Business Occupations		Clerical Practices		Data Processing	
	M	SD	M	SD	M	SD
TK	7.60	4.66	7.32	3.97	9.83	6.20
SP	13.04	5.55	13.19	5.32	14.46	5.40
MC	10.42	4.43	10.76	4.23	12.35	5.14
SI	8.63	4.34	8.42	3.95	11.43	5.56
AI	9.02	4.15	8.02	3.69	9.78	5.48
EI	9.71	4.67	8.58	4.69	10.54	6.40
Number of Schools	6		5		9	

Table 8-3. Analysis Summary
(Communications & Media)

Category	N	R	Ho ₁	Current	GT r	CL r	GM r	EL r	MM r	Ho ₂
				Selector AI						
Journalism	36	0.80	Rejected	GT	0.48	0.28	0.24	0.57	0.37	Rejected
Printing	102	0.33	Accepted	GM	0.24	0.14	0.09	0.11	0.05	—

Table 8-4. Means and Standard Deviations
(Communications & Media)

Variable	Journalism		Printing	
	M	SD	M	SD
GPA	3.00	.94	2.10	.76
CS	52.14	16.97	38.21	11.62
WK	15.64	3.95	11.87	4.86
AR	14.14	4.96	9.73	4.89
TK	11.00	5.98	11.20	5.68
SP	14.28	5.35	11.00	5.00
MC	13.19	3.94	11.23	4.85
SI	10.56	4.29	11.89	5.08
AI	9.25	4.60	11.51	4.67
EI	11.61	5.53	11.30	5.63
Number of Schools	1		9	

Table 8-5. Analysis Summary
(Construction)

Category	N	R	Ho ₁	Current Selector AI	GT r	CL r	GM r	EL r	MM r	Ho ₂
Building Trades	83	0.34	Accepted	GM	0.29	0.26	0.27	0.20	0.14	—
Cabinet Making	17	0.89	Accepted	GM	0.07	0.03	-0.60	-0.23	0.01	—
Carpentry	258	0.33	Rejected	GM	0.06	0.11	0.22	0.27	0.24	Accepted
Civil Technology	18	0.89	Accepted	GT	0.23	-0.07	-0.24	-0.25	-0.38	—
Drafting	373	0.44	Rejected	GT	0.33	0.33	0.30	0.31	0.26	Rejected
Masonry	116	0.43	Rejected	GM	-0.12	-0.08	-0.06	0.09	0.04	Rejected
Painting & Decorating	26	0.78	Rejected	GM	0.66	0.51	0.05	0.08	-0.02	Rejected
Plumbing	101	0.48	Rejected	GM	0.17	0.39	0.28	0.36	0.38	Rejected

Table 8-6. Means and Standard Deviations
(Construction)

Variable	Building Trades		Cabinet Making		Carpentry		Civil Technology		Drafting		Masonry	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
GPA	3.00	.88	2.31	.58	2.41	.91	2.99	.88	2.57	.99	2.59	.77
CS	40.75	8.70	34.82	11.82	42.63	11.45	45.94	12.63	46.12	13.72	40.50	10.51
WK	12.75	4.09	8.82	3.31	12.88	4.69	13.50	5.37	13.08	4.31	10.99	4.80
AR	12.25	4.70	9.06	4.29	12.52	4.98	13.17	3.63	13.41	4.99	10.89	4.61
TK	16.69	4.72	13.77	4.87	18.14	4.53	17.17	4.25	14.20	5.19	13.77	4.79
SP	12.76	6.05	11.41	5.19	13.97	5.48	15.28	4.93	15.87	5.31	11.69	4.97
MC	13.46	3.96	9.82	3.13	13.94	4.53	15.61	3.25	14.26	4.46	11.56	4.44
SI	16.27	4.61	10.65	5.05	16.93	4.26	15.67	3.07	14.53	4.82	12.75	4.23
AI	14.28	4.49	10.59	6.45	13.59	4.50	16.06	4.43	12.80	4.79	10.87	5.03
EI	13.25	5.50	8.00	3.57	12.97	4.96	16.89	3.80	14.36	5.00	10.17	5.72
Number of Schools	6		4		16		2		21		8	

Table 8-6 (Cont'd)

Variable	Printing & Decorating		Plumbing	
	M	SD	M	SD
GPA	3.06	.84	2.59	.72
CS	48.00	12.75	42.47	11.67
WK	15.58	3.60	12.67	3.77
AR	13.92	5.77	13.15	4.46
TK	12.96	5.69	17.77	4.18
SP	16.58	3.98	13.51	5.28
MC	13.81	3.90	14.35	3.81
SI	12.31	4.99	16.21	3.99
AI	10.85	5.25	14.09	3.89
EI	12.96	6.21	14.02	4.37
Number of Schools	2		8	

Table 8-7. Analysis Summary
(Consumer & Homemaking)

Category	N	R	Ho ₁	Current Selector	GT	CL	GM	EL	MM	Ho ₂
				AI	r	r	r	r	r	
Child Care	79	0.39	Accepted	GT	0.22	0.33	0.18	0.17	0.18	—
Household Arts	64	0.35	Accepted	GT	0.23	0.28	0.09	0.16	0.17	—

Table 8-8. Means and Standard Deviations
(Consumer & Homemaking)

Variable	Child Care		Household Arts	
	M	SD	M	SD
GPA	3.02	.95	2.81	.77
CS	52.54	20.26	56.89	15.74
WK	13.18	4.92	13.63	3.99
AR	10.10	4.95	10.80	5.04
TK	6.20	4.01	6.67	4.14
SP	11.98	5.40	11.02	5.00
MC	9.61	3.85	9.39	4.26
SI	7.35	3.87	7.70	3.94
AI	7.67	4.17	8.25	3.49
EI	6.65	4.90	7.52	4.30
Number of Schools	4		2	

*Table 8-9. Analysis Summary
(Environment)*

Category	N	R	Ho ₁	Current Selector AI	GT r	CL r	GM r	EL r	MM r	Ho ₂
Conservation	23	0.55	Accepted	GT	0.36	0.12	0.22	0.01	0.24	—

*Table 8-10. Means and Standard Deviations
(Environment)*

Variable	M	Conservation AI	SD
GPA	2.44		.83
CS	52.74		19.02
WK	15.70		3.43
AR	12.91		5.00
TK	12.17		3.62
SP	13.22		4.86
MC	13.87		3.39
SI	13.22		3.49
AI	10.44		4.16
EI	11.91		4.60
Number of Schools	2		

*Table 8-11. Analysis Summary
(Fine Arts & Humanities)*

Category	N	R	Ho ₁	Current Selector AI	GT r	CL r	GM r	EL r	MM r	Ho ₂
Commercial Art	40	0.62	Accepted	GT	0.39	0.53	0.37	0.34	0.37	—
Graphic Art	159	0.45	Rejected	GT	0.20	0.15	0.21	0.31	0.19	Rejected
Fashion Design	23	.079	Accepted	GT	0.31	0.33	0.38	0.14	0.13	—
Jewelry & Ceramics	29	0.69	Accepted	GT	0.20	0.18	0.39	0.29	0.27	—

*Table 8-12. Means and Standard Deviations
(Fine Arts & Humanities)*

Variable	Commercial Art		Graphic Art		Fashion Design		Jewelry & Ceramics	
	M	SD	M	SD	M	SD	M	SD
GPA	2.76	.88	2.75	.90	3.02	.79	3.04	.77
CS	43.95	10.18	48.39	17.33	46.35	12.46	49.41	20.82
WK	14.10	5.01	14.04	4.56	11.70	5.43	12.55	4.92
AR	11.08	5.51	12.69	5.25	9.96	4.37	11.14	6.50
TK	11.90	5.27	13.36	5.43	5.70	4.25	9.83	5.02
SP	15.00	5.08	14.85	4.82	10.91	5.09	13.62	6.21
MC	13.05	4.23	13.91	4.62	8.97	3.73	9.52	5.42
SI	11.53	5.10	13.10	5.58	6.87	3.70	9.45	5.67
AI	10.95	5.64	12.16	5.17	8.13	4.22	8.59	5.88
EI	11.85	5.56	12.26	6.42	7.17	5.00	7.45	6.51
Number of Schools	7		11		2		1	

*Table 8-13. Analysis Summary
(Health)*

Category	N	R	Ho ₁	Current Selector	GT r	CL r	GM r	EL r	MM r	Ho ₂
				AI						
Health Occupations	170	0.55	Rejected	GT	0.37	0.51	0.12	0.26	0.21	Rejected
Nursing	31	0.79	Rejected	GT	0.56	0.67	0.46	0.37	0.34	Accepted
Laboratory Tech	18	0.70	Accepted	GT	-0.07	-0.20	-0.14	-0.07	-0.17	—

*Table 8-14. Means and Standard Deviations
(Health)*

Variable	Health Occupations		Nursing		Laboratory Technician	
	M	SD	M	SD	M	SD
GPA	3.00	.74	3.03	.78	2.40	.95
CS	52.38	15.34	44.29	10.42	43.00	13.87
WK	13.64	3.74	13.61	4.26	13.06	5.91
AR	11.95	5.01	9.77	4.75	13.61	4.51
TK	6.84	4.36	6.45	2.98	9.39	4.23
SP	12.08	5.06	10.23	5.45	12.72	4.51
MC	10.20	4.02	9.29	4.08	9.94	7.35
SI	9.04	3.70	7.71	3.34	9.44	6.36
AI	9.04	4.41	7.94	2.72	7.89	5.24
EI	9.27	4.60	7.48	4.20	8.89	6.05
Number of Schools	10		1		3	

Table 8-15. Analysis Summary
(Manufacturing)

Category	N	R	Ho ₁	Current Selector AI	GT r	CL r	GM r	EL r	MM r	Ho ₂
Air Conditioning	97	0.35	Accepted	GM	0.23	0.24	0.19	0.17	-0.03	—
Appliance Repair	62	0.62	Rejected	GM	0.30	0.30	0.42	0.38	0.43	Accepted
Electrical Trades	468	0.41	Rejected	EL	0.27	0.29	0.32	0.34	0.26	Rejected
Electronic Trades	431	0.31	Rejected	EL	0.11	0.22	0.10	0.14	0.06	Rejected
Industrial Chemistry	29	0.55	Accepted	GT	0.21	0.30	-0.25	-0.03	-0.21	—
Machine Shop	345	0.36	Rejected	GM	0.19	0.19	0.22	0.22	0.27	Rejected
Maintenance Mechanic	56	0.66	Rejected	GM	0.32	0.16	0.56	0.40	0.38	Accepted
Metal Working	124	0.38	Rejected	GM	0.12	0.22	0.25	0.12	0.11	Accepted
Oil Burner Repair	17	0.86	Accepted	GM	0.04	0.38	-0.04	0.18	0.32	—
Small Engine Repair	86	0.51	Rejected	MM	0.32	0.33	0.39	0.32	0.34	Accepted
Steam Engineering	14	0.70	Accepted	GM	0.09	0.13	0.27	0.21	0.09	—
Tailor	148	0.68	Rejected	GT	0.56	0.40	0.33	0.47	0.34	Rejected
Welding	147	0.56	Rejected	GM	0.36	0.37	0.49	0.46	0.40	Accepted
Wood & Metal Wkg	185	0.34	Rejected	GM	0.12	0.13	0.22	0.25	0.23	Accepted

Table 8-16. Means and Standard Deviations
(Manufacturing)

Variable	Air Conditioning		Appliance Repair		Electrical Trades		Electronic Trades		Industrial Chemistry		Machine Shop	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
GPA	2.39	.74	2.13	.88	2.51	.90	2.60	1.00	3.04	.74	2.51	.90
CS	38.28	10.32	39.52	12.36	43.47	12.42	44.15	12.51	47.72	13.54	38.15	13.21
WK	12.88	4.48	11.89	4.85	13.02	4.02	14.41	4.15	14.35	3.57	11.25	5.24
AR	12.04	5.02	10.97	5.41	13.13	4.91	14.56	4.95	14.83	4.62	11.08	5.59
TK	15.79	4.15	14.05	5.95	15.43	5.41	15.58	5.02	10.10	5.58	14.82	5.45
SP	13.28	4.62	12.37	5.33	14.17	5.25	15.26	5.26	14.97	5.85	12.66	5.56
MC	14.18	4.12	12.34	5.15	14.46	4.46	15.22	4.93	13.21	3.99	12.39	5.40
SI	16.45	3.66	13.81	5.75	15.15	4.85	15.91	5.12	10.41	4.99	14.36	5.47
AI	14.41	4.17	12.07	5.89	14.06	5.24	14.68	5.14	10.14	4.64	13.01	5.73
EI	16.35	4.37	13.21	6.60	18.48	5.19	18.99	5.62	10.59	5.83	12.44	6.14
Number of Schools	7		5		18		23		2		18	

Table 8-16 (Cont'd)

Variable	Maintenance Mechanic		Metal Working		Oil Burner Repair		Small Engine Repair		Steam Engineering		Tailor	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
GPA	2.27	.99	2.58	.82	2.06	.80	2.21	1.12	1.86	.83	2.86	1.05
CS	38.75	12.84	40.77	11.29	26.06	15.51	38.71	15.97	40.79	17.95	46.24	18.50
WK	11.16	4.37	13.08	4.50	11.18	4.20	12.26	4.54	11.57	4.10	12.41	5.46
AR	10.46	4.83	12.11	4.92	8.77	3.19	10.76	4.50	10.29	4.80	11.03	6.66
TK	13.13	5.37	17.07	4.59	15.18	3.71	14.16	5.30	14.93	4.20	8.18	4.49
SP	11.23	5.60	14.90	5.67	11.53	6.03	12.26	6.31	11.29	4.42	13.03	5.90
MC	10.61	5.12	13.65	5.22	11.77	3.75	13.20	4.52	12.86	3.62	10.64	4.81
SI	13.25	4.55	16.37	5.08	13.18	5.63	14.51	4.59	14.14	3.83	8.41	4.43
AI	11.11	6.14	14.27	5.30	11.24	4.52	12.71	5.09	12.07	4.11	8.16	4.12
EI	11.21	5.64	13.90	5.90	12.71	6.18	12.69	5.72	11.50	6.16	8.00	5.00
Number of Schools	5		15		1		6		1		6	

Table 8-16 (Cont'd)

Variable	Welding		Wood & Metal Working	
	M	SD	M	SD
GPA	2.60	.92	2.85	1.00
CS	38.76	10.99	45.48	16.62
WK	11.43	4.50	12.21	4.38
AR	10.90	4.73	12.32	5.05
TK	15.91	4.60	15.78	4.65
SP	11.89	5.26	14.12	5.12
MC	12.58	4.98	14.01	4.35
SI	15.11	4.72	15.39	5.01
AI	14.57	5.10	13.29	4.68
EI	13.32	5.16	14.44	5.32
Number of Schools	12		2	

Table 8-17. Analysis Summary
(Marketing & Distribution)

Category	N	R	Ho ₁	Current Selector AI	GT r	CL r	GM r	EL r	MM r	Ho ₂
Distributive Education	89	0.37	Accepted	GT	0.24	0.30	0.22	0.12	0.16	—

Table 8-18. Means and Standard Deviations
(Marketing & Distribution)

Variable	Distributive Education	
	M	SD
GPA	2.69	.99
CS	50.14	14.89
WK	13.23	4.30
AR	12.10	4.32
TK	11.61	5.72
SP	12.91	5.29
MC	10.87	5.06
SI	10.79	5.92
AI	11.08	5.69
EI	10.19	5.89
Number of Schools	7	

Table 8-19. Analysis Summary
(Personal Services)

Category	N	R	Ho ₁	Current Selector AI	GT r	CL r	GM r	EL r	MM r	Ho ₂
Building Maintenance	33	0.43	Accepted	GM	0.18	0.23	0.24	0.26	0.32	—
Cook	20	0.76	Accepted	GT	0.68	0.47	0.40	0.53	0.62	—
Cosmetology	159	0.46	Rejected	GT	0.37	0.40	0.17	0.10	0.12	Accepted
Food Service	250	0.43	Rejected	GT	0.25	0.37	0.14	0.18	0.16	Rejected
Restaurant Mgt	39	0.63	Accepted	GT	0.25	0.23	0.34	0.41	0.25	—

*Table 8-20. Means and Standard Deviations
(Personal Services)*

Variable	Building Maintenance		Cook		Cosmetology		Food Service		Restaurant Management	
	M	SD	M	SD	M	SD	M	SD	M	SD
GPA	2.58	.83	2.31	.59	2.82	.81	3.03	.91	2.24	.87
CS	33.82	15.72	33.95	9.36	51.28	15.54	45.68	16.08	44.00	16.97
WK	10.46	7.03	10.65	4.35	12.16	4.30	12.72	4.48	11.41	5.18
AR	8.30	6.45	9.30	4.39	9.99	4.17	11.05	5.09	9.49	5.32
TK	15.12	5.76	9.36	6.37	7.01	4.90	9.39	5.01	12.00	5.83
SP	12.12	5.15	9.65	7.04	11.24	4.62	12.47	5.45	11.39	6.53
MC	11.61	6.02	8.60	4.72	9.64	4.14	10.53	5.07	10.62	5.17
SI	13.70	5.96	8.65	5.96	8.02	4.35	9.38	5.21	12.00	5.58
AI	12.27	7.12	7.70	4.34	8.53	4.25	9.27	4.95	10.54	5.26
EI	11.30	5.87	8.35	6.12	8.91	5.53	8.81	6.00	9.03	6.20
Number of Schools	3		4		11		12		2	

*Table 8-21. Analysis Summary
(Transportation)*

Category	N	R	Ho ₁	Current	GT	CL	GM	EL	MM	Ho ₂
				Selector						
				AI	r	r	r	r	r	
Auto Service	476	0.46	Rejected	MM	0.32	0.35	0.36	0.36	0.38	Rejected
Aviation Mechanics	37	0.55	Accepted	MM	0.02	0.04	0.39	0.40	0.29	—
Body & Fender Repair	129	0.42	Rejected	MM	0.13	0.15	0.35	0.14	0.24	Accepted
Diesel Mechanics	51	0.56	Rejected	MM	0.30	0.10	0.25	0.52	0.36	Accepted
Transportation	21	0.69	Accepted	MM	0.19	0.17	0.33	0.11	0.14	—

*Table 8-22. Means and Standard Deviations
(Transportation)*

Variable	Auto Service		Aviation Mechanics		Body & Fender Repair		Diesel Mechanics		Transportation	
	M	SD	M	SD	M	SD	M	SD	M	SD
GPA	2.40	.95	2.09	.76	2.32	.77	2.08	.84	2.29	1.03
CS	40.10	12.97	45.30	10.24	38.67	10.87	40.59	12.06	45.14	12.30
WK	12.34	4.81	15.14	4.24	10.97	4.42	12.00	3.96	13.43	3.46
AR	11.28	5.20	13.92	5.01	10.50	5.07	11.80	4.41	13.29	3.40
TK	15.67	5.00	16.30	4.98	15.76	4.03	16.00	5.67	15.52	4.46
SP	12.98	5.61	16.78	4.82	12.09	4.82	13.26	5.19	15.52	4.39
MC	13.68	5.18	16.54	4.20	12.24	4.88	13.22	5.87	13.43	3.94
SI	15.64	5.11	16.65	3.30	14.04	5.41	15.10	4.98	16.10	4.34
AI	17.31	5.40	15.68	4.26	14.23	5.63	16.90	5.09	15.29	3.89
EI	14.50	5.83	16.41	4.55	11.88	5.41	12.00	5.72	14.86	6.58
Number of Schools	24		2		15		3		2	

Appendix 9

Hypothesis Tests

The first null hypothesis (H_{01}), $R^2 = 0$, was tested with the F statistic — $F = (R^2/1-R^2) (N-K)/(K-1)$ with $K-1$ and $N-K$ degrees of freedom. N is the number of subjects and K is the number of variables (Steele, 1960, p302). For the situation in this report, $K = 10$ and N varies by vocational-technical category, thus $df_1 = 9$ and $df_2 = N-10$. Table 9-1 shows the test results and the critical values for the $P = .05$ level.

The second and third null hypothesis, $R_1^2 - R_2^2 = 0$, were tested with $F = (R_1^2 - R_2^2) (df_2)/(1-R_1^2) (df_1)$ where R_1^2 is the squared multiple correlation coefficient for the full model and R_2^2 is the squared multiple correlation coefficient for the restricted model. df_1 is 9 in all cases and df_2 is $N-10$ (Bottenburg and Ward, p126, 1963). The full model was the regression over the criteria variable and the nine ASVAB subtests. The restricted model was the regression over a fixed weighted composite. Tables 9-2 and 9-3 show the composites, the test results and the critical values of F .

The fourth null hypothesis, $r_{11} - r_{12} = 0$, was tested (where r_{11} is for the current composite, r_{12} is for the new composite) with $t = (r_{11} - r_{12}) [(N-3) (1 + r_{23}) / 2(1-r_{12}^2 - r_{11}^2 - r_{23}^2 + 2r_{12} r_{13} r_{23})]^{0.5}$ with $N-3$ degrees of freedom. (Guilford, p190, 1965). Table 9-3 shows the test results together with the critical value of t .

Table 9-1. H_{01} : R^2 Not Different from 0

Category	F	df ₂	Required F p=.05	H ₀₁ Rejected
Agriculture	1.016	13	2.72	No
Horticulture	2.515	54	2.05	Yes
Business Occupations	6.540	255	1.92	Yes
Clerical Practices	8.296	330	1.91	Yes
Data Processing	3.114	149	1.94	Yes
Journalism	5.148	26	2.27	Yes
Printing	1.466	92	1.98	No
Building Trades	1.096	73	2.01	No
Cabinet Making	3.015	7	3.68	No
Carpentry	3.268	248	1.92	Yes
Civil Technology	3.219	8	3.39	No
Drafting	9.741	363	1.91	Yes
Masonry	2.597	106	1.97	Yes
Painting & Decorating	2.691	16	2.54	Yes
Plumbing	3.102	91	1.98	Yes
Child Care	1.403	69	2.01	No
Household Arts	0.853	54	2.05	No
Conservation	0.637	13	2.72	No

Table 9-1 (Cont'd)

Category	F	df ₂	Required F p=.05	H ₀₁ Rejected
Commercial Art	2.094	30	2.21	No
Graphic Art	4.153	149	1.94	Yes
Fashion Design	2.394	13	2.72	No
Jewelry & Ceramics	1.891	19	2.43	No
Health Occupations	7.517	160	1.94	Yes
Laboratory Technician	0.854	8	3.39	No
Nursing	3.881	21	2.37	Yes
Air Conditioning	1.367	87	1.98	No
Appliance Repair	3.598	52	2.07	Yes
Electrical Trades	10.0124	458	1.90	Yes
Electronic Trades	5.126	421	1.90	Yes
Industrial Chemistry	0.924	19	2.43	No
Machine Shop	5.409	335	1.91	Yes
Maintenance Mechanic	4.008	46	2.09	Yes
Metal Working	2.192	114	1.96	Yes
Oil Burner Repair	2.279	7	3.68	No
Small Engine Repair	3.036	76	2.00	Yes
Steam Engineering	0.434	4	6.00	No
Tailor	13.192	138	1.95	Yes
Welding	7.050	137	1.95	Yes
Wood & Metal Working	2.498	175	1.93	Yes
Distributive Education	1.430	79	1.99	No
Building Maintenance	0.591	23	2.32	No
Cook	1.559	10	3.02	No
Cosmetology	4.539	149	1.94	Yes
Food Service	6.015	240	1.92	Yes
Restaurant Management	2.077	29	2.22	No
Auto Service	13.687	466	1.90	Yes
Aviation Mechanics	1.003	27	2.25	No
Body & Fender Repair	2.821	119	1.96	Yes
Diesel Mechanics	2.123	41	2.12	Yes
Transportation	1.104	11	2.90	No

Table 9-2. H_{02} : $(R_2 - r_2)$ is Not Different from 0 for Current Predictor Composite

Category	Predictor Composite	F	df ₂	Required F p=.05	H ₀₂ Rejected
Horticulture	GT	1.624	55	2.05	No
Business Occupations	CL	1.934	256	1.91	Yes
Clerical Practices	CL	3.99	331	1.91	Yes
Data Processing	EL	1.949	150	1.94	Yes
Journalism	GT	3.402	27	2.25	Yes
Carpentry	GM	1.832	249	1.91	No
Drafting	GT	4.227	364	1.90	Yes
Masonry	GM	2.575	107	1.97	Yes
Painting and Decorating	GM	2.848	17	2.50	Yes
Plumbing	GM	2.086	92	1.98	Yes
Graphic Art	GT	3.336	150	1.94	Yes
Health Occupations	GT	4.063	161	1.94	Yes
Nursing	GT	1.998	22	2.35	No
Appliance Repair	GM	1.939	53	2.06	No
Electrical Trades	EL	2.812	459	1.90	Yes
Electronic Trades	EL	4.064	422	1.90	Yes
Machine Shop	GM	3.305	336	1.91	Yes
Maintenance Mechanic	GM	1.196	47	2.08	No
Metal Working	GM	1.264	115	1.96	No
Small Engine Repair	MM	1.704	77	1.99	No
Tailor	GT	4.352	139	1.95	Yes
Welding	GM	1.770	138	1.95	No
Wood & Metal Working	GM	1.397	176	1.93	No
Cosmetology	GT	1.697	150	1.94	No
Food Service	GT	3.959	241	1.91	Yes
Auto Service	MM	4.035	467	1.90	Yes
Body and Fender Repair	MM	1.926	120	1.95	No
Diesel Mechanics	MM	1.286	42	2.11	No

Table 9-3.

Category	Current Selector AI	r_{ca}	R	Proposed Selector AI	r_a	F	Ho ₃ Required F		Ho ₁ Required t	
							df [*] 2	(P=.05)	t	df (P=.05)
Business Occupations	CL	0.36	0.43	AR+WK+1/5CS	0.42	0.505	256	1.91	11.036	263 1.968
Clerical Practices	CL	0.31	0.43	AR+WK+1/5CS	0.39	1.386	331	1.91	2.949	337 1.966
Data Processing	EL	0.27	0.41	SP+MC+EL	0.33	1.162	150	1.94	2.232	156 1.976
Journalism	GT	0.48	0.80	AR+SP	0.71	1.097	27	2.25	2.114	33 2.030
Drafting	GT	0.33	0.44	AR+SP	0.40	1.683	364	1.91	3.043	370 1.966
Masonry	GM	-0.06	0.43	SP+TK+1/3CS	0.23	1.875	107	1.97	5.255	113 1.979
Painting & Decorating	GM	0.05	0.78	GT	0.66	0.777	17	2.50	3.772	23 2.069
Plumbing	GM	0.28	0.48	AI+TK+1/3CS	0.42	0.684	92	1.98	2.016	98 1.984
Graphic Art	GT	0.20	0.45	AR+SP	0.34	1.783	150	1.94	2.759	156 1.976
Health Occupations	GT	0.37	0.55	CL	0.51	0.944	161	1.93	2.345	167 1.976
Electrical Trades	EL	0.34	0.41	AR+TK+EL	0.37	1.849	459	1.90	0.794	465 1.965
Electronic Trades	EL	0.14	0.31	AR+TK+EL	0.28	1.274	422	1.90	2.433	428 1.965
Machine Shop	GM	0.22	0.36	TK+AI	0.33	0.805	336	1.91	2.855	342 1.966
Tailor	GT	0.56	0.68	AR+SP+1/5CS	0.65	1.196	139	1.94	2.640	145 1.976
Food Service	GT	0.25	0.43	CL	0.37	0.969	241	1.91	2.840	247 1.968
Auto Service	MM	0.38	0.46	AI+TK+1/3CS	0.44	0.872	467	1.90	2.387	473 1.965

* for Ho₃ df₁=9

Appendix 10
Summary Statistics for Schools with Overall GPA

School	N	GPA		Multiple R	GT		r
		Mean	SD		Mean	SD	
7407	339	2.30	.85	.51	23.35	8.36	0.38
7409	65	2.96	.64	.34	27.17	7.40	0.33
7410	90	2.26	.59	.54	29.60	6.31	0.41
7412	255	2.44	.71	.45	28.21	7.03	0.40
7415	314	1.94	.76	.24	22.63	9.06	0.20
7417	42	2.13	.68	.71	17.60	7.67	0.29
7422	57	2.49	.70	.43	27.47	7.84	0.37
7424	107	2.32	.60	.41	15.35	7.21	0.39
7436	55	2.53	.55	.45	30.71	6.09	0.37
7438	304	2.29	.62	.29	24.81	7.16	0.27
7442	1620	2.06	.88	.49	26.27	8.15	0.43
7445	533	2.36	.67	.56	21.94	8.58	0.48
7448	252	1.65	.68	.54	24.02	7.65	0.50
7451	110	2.48	.55	.17	32.11	7.23	0.11
7452	27	2.92	.79	.72	31.48	7.81	0.48
7457	145	2.85	.58	.36	28.62	8.78	0.37
7458	125	2.42	.58	.40	28.33	6.25	0.32
7459	307	2.04	.91	.57	22.80	7.50	0.47